Tempe Fire Department Policies and Procedures
Fireground Safety
205.07
Rev 2-19-87

RESPONSE SAFETY

The use of seat belts is required of all personnel, at all times, when driving or riding in a moving Fire Department vehicle. This rules does apply to personnel riding in "jump seats."

At no time are personnel to ride in a "standing up" position on a moving fire apparatus. Riding on tailboards is not permitted at any time. Other precautions must be taken when hose or other equipment is carried on tailboards, as personnel will not be used to "secure" this equipment.

When a company receives an emergency dispatch while on the road, they should turn on their emergency lights, pull to the right side, and stop. This will allow personnel to gear-out and belt-in before responding.

Responding against traffic can be hazardous and must be done with extreme caution. Regardless of traffic conditions, an apparatus will never exceed 20 mph in an on-coming lane.

TACTICAL POSITIONING

Positioning of operating companies can severely affect the safety/survival of such companies. Personnel must use extra caution when placed in the following positions:

- Above the fire (floors/roof).
- Where fire can move in behind them.
- Where sector cannot control position/retreat.
- When involved with opposing fire streams.
- Combining interior and exterior attack.
- With limited access - one way in/out.
- Operating under involved roof structures.
- In areas containing hazardous materials.
- On hazardous material incidents (wind, hills, etc.).
- Below-ground fires (basements, etc.).
- In areas where a backdraft potential exists.
- In large structures which increase chances of personnel becoming disoriented or lost.

The safety of firefighting personnel represents the major reason for an effective and well-timed offensive/defensive decision, and the associate write-off by Command. When the rescue of savable victims has been completed, Command must ask:

"Is the risk to my personnel worth the property I can save?"

When operating in a defensive mode, operating positions should be as far from the involved area as possible while still remaining effective. Position and operate from behind barriers (fences, walls, etc.), if available.

The intent is for personnel to utilize safe positioning where possible/available, in an effort to safeguard against sudden hazardous developments such as backdraft, explosion, structural collapse, etc.

When operating in an offensive mode, be aggressively offensive. An effective coordinated interior attack operation directed toward knocking down the fire eliminates most eventual safety problems.

Due to the inherent hazards of the immediate fire or incident scene, efforts will be made by Command to limit the number of personnel on the fireground to those assigned to a necessary function. All personnel shall be:

- Positioned in Staging.
- Assigned to a task or operating within a sector.
- Having completed an assignment and another assignment is available with that sector - crews should be assigned to a resource, staging, or rehabilitation sector until such time as they can be reassigned back to an operating sector or released to an in-service status.

The intent of this procedure is to minimize fireground confusion/congestion and to limit the number of personnel exposed to fireground hazards to only those necessary to successfully control the operation. Individuals or crews shall be restricted from wandering about the fireground or congregating in non-functional groups. If personnel have not been assigned to a sector or do not have a necessary staff function to perform, they shall remain outside the fireground perimeter.

When it is necessary to engage personnel in exceptionally hazardous circumstances (i.e., to perform a rescue), Command will limit the number of personnel exposed, to an absolute minimum, and assure that all feasible safety measures are taken.

In extremely hazardous situations (flammable liquids, LP gas, hazardous materials, etc.), Command will engage only an absolute minimum number of personnel within the Hot Zone. Unmanned master streams will be utilized wherever possible. (Refer to Hazardous Materials Procedure 208.01.)

In situations where crews must operate from opposing or conflicting positions, such as front versus rear attack streams, roof crews versus interior crews, etc., utilize radio or face-to-face communications to coordinate your actions with those of the opposing crew, in an effort to prevent needless injuries. Command should notify sector officers or company officers of opposing or conflicting operations.

Ground crews must be notified and evacuated from interior positions before ladder pipes or deck guns go into operation.

Do not operate exterior streams, whether hand lines, master streams, ladder pipes, etc., into an area where interior crews are operating. This procedure is intended to prevent injuries to personnel due to stream blast and the driving of fire and/or heavy heat and smoke onto interior crews.

When laddering a roof, the ladder selected shall be one which will extend 3' - 4' above the roof line. This shall be done in an effort to provide personnel operating on the roof with a visible means of egress.

Aerial ladder devices should be used as much as possible to provide the most stable access and egress possible. This is particularly important should roof conditions deteriorate requiring a rapid escape by a number of personnel.

If possible, when laddering buildings under fire conditions, place ladders near building corners or fire walls, as these areas are generally more stable in the event of structural failure.

When operating either above or below ground level, establish at least two (2) separate escape routes/means where possible (i.e., stairways, ladders, exits, etc.), preferably at opposite ends or diagonal corners of the building or separated by considerable distance. This wall will require the placement of a second ladder in situations where personnel are working on the roof of a building.
Many safety principles revolve around action that takes place within the fireground perimeter or on the fireground.

For the purpose of Tempe Fire Department operations, the fireground perimeter can be defined as: The area inside an imaginary boundary that has been determined by safety considerations according to the foreseeable hazards of the particular incident. (See Figure 1 and 2.)

The flexible boundary that determines the fireground can be altered by various safety factors (Figure 2).

All personnel entering the fireground perimeter shall:

- Wear protective clothing, SCBA, and personal locator alarm.
- Have crew intact.
- Have a portable radio.
- Have an assignment/be assigned to a sector.

ALL OTHERS STAY OUTSIDE.

The fireground perimeter is not necessarily marked by any warning device. The area is defined, in most cases, by standard definitions described in this procedure. Where a hazard exists, banner tape may be used to identify the specific area where special precautions are necessary.

Yellow Fireline tape is intended to keep civilians and spectators out of an area where a hazard exists or where operations are in progress. This tape may also be used as a warning device for personnel authorized to operate on the fireground. Yellow tape indicates that personnel should be aware of a hazard and should cross the tape only when precautions have been taken.

Red and white hazardous area tape is used to define a special hazard zone. No personnel shall cross this tape under any circumstances, except through an entrance/exit (Lobby Control) when provided. This tape will be used to define hazard areas involving hazardous materials, structural collapse areas, and similar perils.

SECTORS

The safety of firefighting personnel represents a major reason for fireground sectorization. Sector commanders must maintain the capability to communicate with forces under their command, so that they can control both the position and function of their companies.

Sector officers and company officers shall be able to account for the whereabouts and welfare of all crews/crew members under their assignment. (See Personnel Identification System below).

Company officers shall insure that all crew members are operating within their assigned sector only. Crews will not leave their respective sectors unless okayed by the sector officer.

When crews are operating within a sector, company officers shall keep the sector officer informed of changing conditions within the sector area, and particularly those changing conditions which may affect the safety of personnel.

Hazards that will affect only a specific sector area should be dealt with within that sector and need not necessarily affect the entire operation.

REHABILITATION

In an effort to regulate the amount of fatigue suffered by fireground personnel during sustained field operations, company officers should frequently assess the physical condition of their crew members. When crew members exhibit signs of serious physical or mental fatigue, the entire crew should be reassigned to a Rehabilitation Sector if possible. Company officers shall request reassignment to Rehabilitation Sector from their sector officer. The company officer's request shall indicate the crew's position/condition, etc., and shall advise as to the need for a replacement crew. Individual crews shall not report to the Rehabilitation Sector unless assigned by the fireground commander.

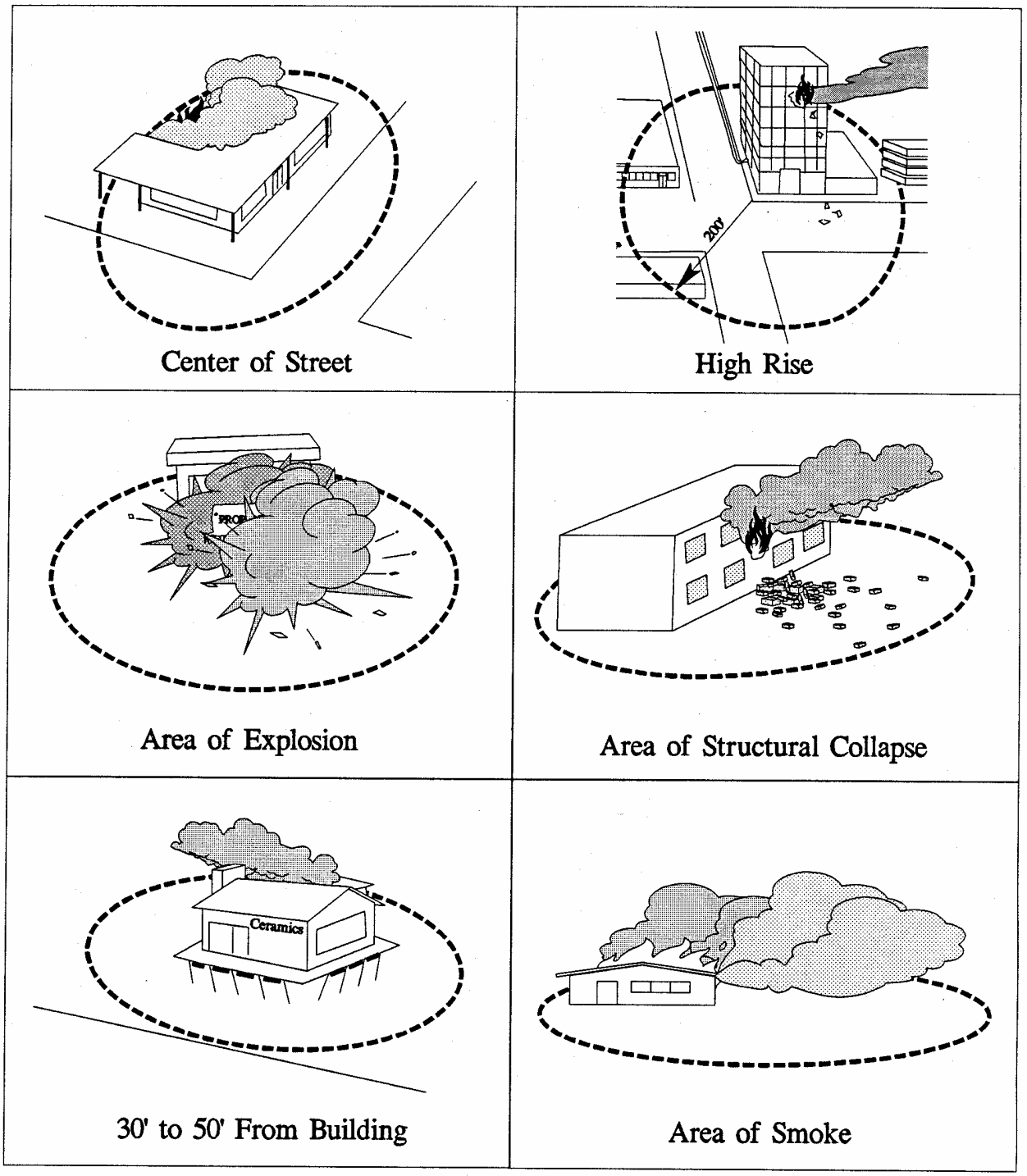
Center of Street
200'
High Rise
Area of Explosion
Area of Structural Collapse
Ceramics
30' to 50' From Building
Area of Smoke

Figure 2

It is the ongoing responsibility of Command to summon adequate resource to tactical situations to effectively stabilize that situation and to maintain adequate resource during extended operations to complete all operational phases.

The rotation of companies will be utilized by Command during extended operations to provide an effective on-going level of personnel and personnel performance. Fire Alarm will assist in coordinating the rotation of companies during such campaign operations.

It is the intent of this procedure to reduce the fatigue and trauma experienced during difficult operations to a reasonable (and recoverable) level, and is in no way intended to lessen the individual and collective efforts expected to all members.

SAFETY VESTS

Lightweight reflective safety vests are provided for all personnel. These vests are to be worn at traffic accidents and all other types of incidents which expose personnel to the dangers of vehicular traffic. Safety vests are not required when turn-out coats are worn in these types of incidents. Turn-out coats must be kept reasonably clean to assure a safe level of visibility.

PERSONAL LOCATOR ALARMS

A personal locator alarm is attached to each breathing apparatus. These units are to be "placed in service" whenever the self-contained breathing apparatus is used, and at any other time where it is possible that a member could become disoriented, lost, or otherwise need to sound a distress signal while wearing self-contained breathing apparatus.

PERSONNEL IDENTIFICATION SYSTEM

As an accountability measure, sector officers must record and maintain the identity of all personnel assigned to operate in high hazard areas such as: basements, high rise, etc., particularly where individual assignments are made which may place members in precarious positions.

The following standard method for insuring this vital accountability shall be utilized as conditions dictate the need.

1. All firefighting personnel will have two (2) velcro name tags attached to the underside of their turn-out coat collar.

2. As sector officers make assignments which may place personnel in precarious positions, they shall collect from each assignment member, a velcro name tag and place it on the velcro backing material provided.

3. Sector officers shall account for each member, upon completion of the assignment, by returning to each member his/her respective name tag.

SAFETY SECTOR

The recognition of situations which present inordinate hazards to fireground personnel and the proper response to safeguard personnel from those hazards, is of critical importance to all fire department operations.

Command has the responsibility to recognize situations involving a high risk to personnel and to initiate appropriate safety measures.

Command shall establish a safety sector at incidents involving an inordinate danger to personnel. Command

should consider establishing a safety sector in:

- Complex fire situations.
- Hazardous structural conditions (existing or potential).
- Hazardous materials incidents.
- Confined space emergencies.
- Or any other situation where a Safety Sector could be advantageous to the overall safety of operations.

Command may designate any available personnel to establish a Safety Sector when the need is indicated. This should be a high priority assignment.

When the need for specialized assistance is noted, Command should insure the response of appropriate personnel.

The establishment of a Safety Sector or the presence of a Safety officer on the scene, in no way diminishes the responsibility of all officers for the safety of their assigned personnel, and of each and every member to utilize common (safety) sense and work within the intent of established safety procedures at all times.

STRUCTURAL COLLAPSE

In recent times, structural collapse has been a leading cause of serious injuries and death to firefighters. For this reason, the possibility of structural collapse should be a major consideration in the development of any tactical plan.

Structural collapse is always a possibility when a building is subject to intense fire or fire of long duration. In fact, if fire is allowed to affect a structure long enough, some structural failure is inevitable.

Regardless of the age and exterior appearance of the building, there is always the possibility that a principal structural supporting member is being seriously affected by heat and may collapse suddenly, inflicting serious injury to firefighters.

Example: A 100' length of unprotected steel will expand 9" when heated to 1100 degrees Fahrenheit.

In the typical fire involved building, the roof is the most likely candidate for failure, however failure of the roof may very likely trigger a collapse of one or more wall sections. This is especially true if the roof is a peak or dome-type which may exert outward pressure against both the bearing and non-bearing walls upon collapse. In multi-story buildings, or buildings with basements, the floor section above the fire may collapse if supporting members are directly exposed to heat and flames.

A knowledge of various types of building construction can be invaluable to the fire officer from a safety standpoint, as certain types of construction can be expected to fail sooner than others. For example, under fire conditions lightweight truss and bar joist roof construction can be expected to fail after minimal fire exposure.

Structures have been known to collapse without warning, but usually there are signs which may tip off an alert fire officer. Action might be taken to avert any imminent hazard.

Tell Tale Signs

- Cracks in exterior walls.
- Bulges in exterior walls.
- Sounds of structural movement - creaking, groaning, snapping, etc.
- Smoke or water leaking through walls.
- Flexible movement of any floor or roof where firefighters walk.
- Interior or exterior bearing walls or columns - leaning, twisting, or flexing.
- Sagging or otherwise distorted roof lines.

The following construction features or conditions have been known to fail prematurely or to contribute to early structural failure when affected by fire.

Contributing Factors

- Parapet walls.
- Large open (unsupported) areas - supermarkets, warehouses, etc.
- Large signs or marquees - which may pull away from weakened walls.
- Cantilevered canopies - which usually depends on the roof for support and may collapse as the roof fails.
- Ornamental or secondary front or sidewalls - which may pull away and collapse.
- Buildings with lightweight truss, bar joist, or bow string truss, roofs.
- Building supported by unprotected metal - beams, columns, etc.

Buildings containing one or more of the above features must be constantly evaluated for collapse potential. These valuations should be of major consideration toward determining the tactical mode, i.e., offensive/defensive.

It is a principal Command responsibility to continually evaluate and determine if the fire building is tenable for interior operations. This on-going evaluation of structural/fire conditions require the input of company officers advising their sectors and of sectors advising Command of the conditions in their area of operation.

Structures of other than fire protected/heavy timber construction are not designed to withstand the effects of fire, and can be expected to fail after approximately twenty minutes of heavy fire involvement. If after 10-15 minutes of interior operations heavy fire conditions still exist, Command should initiate a careful evaluation of structural conditions, and should be fully prepared to withdraw interior crews and resort to a defensive position.

If structural failure of a building or section of a building appears likely, a perimeter must be established a safe distance from the area which may collapse. All personnel must remain outside this perimeter. (See Figure 1 and 2.)

ROOF OPERATIONS

Personnel must "breath air" from their self-contained breathing apparatus when operating on the roof of a fire building. This includes investigation of roof conditions, ventilation operations, checking for extension, etc.

A ground ladder must be taken to the roof for safety considerations during ventilation operations:

- To distribute weight in an emergency.
- To provide access to someone "through the roof."
- To provide a possible way to stop one's self from going completely through a roof if the roof deck fails.

Command must monitor roof operations to insure that no more personnel than are actually required to complete an operation are allowed on a roof, and that personnel exit the roof immediately upon completion of their assignment.

All personnel must be alert to the condition of roof deck material, particularly with respect to thin roof decks. Thin roof deck conditions in "modern" buildings of lightweight construction, pose a serious danger to firefighters. Often the thin plywood is burned away while the roof covering remains intact with no visible damage from the topside. "Unsuspecting" personnel may sense no problem until they are "through the roof" in these situations.

Sound the roof carefully and continually, starting before stepping off onto the roof. Walk "behind" other personnel, walk near side walls - do not walk diagonally across roofs, but take only the shortest route from a side wall to the point of operation.

Walk on roof support members whenever possible.

When engaged in ventilation operations, start at the farthest point from the escape route and work toward the escape route so that a weak area does not have to be crossed in an emergency should conditions deteriorate.

EVACUATION

Interior firefighting operations should be abandoned when the extent of the fire prohibits, or the structure becomes unsafe to operate within. When such conditions make the building untenable, evacuate, regroup, re-communicate, and re-deploy.

Our primary concern, when a hazard which may affect the safety of fire personnel becomes apparent, is the welfare of those personnel. In an effort to protect personnel who may suffer the adverse effects of hazards such as structural collapse, explosion, backdraft, etc., a structured method of area evacuation must be utilized. One which will provide for the rapid/effective notification of these personnel involved and one which will be able to accurately account for those personnel.

The method of evacuation selected will vary depending on the following circumstances:

- Immanency of the hazard.
- Type and extent of hazard.
- Perception of the area affected by the hazard.

The emergency traffic announcement is designed to provide immediate notification for all fireground personnel of a notable hazard that is either about to occur, or has occurred.

The use of "emergency traffic" should be initiated only when the hazard appears to be imminent.

Any member has the authority to utilize the "emergency traffic" announcement when it is felt that a notable danger to personnel is apparent. However, considerable discretion should be applied to its use - emergency traffic announcements could become ineffective if overused.

When an imminent hazard has been realized, the emergency traffic process should be initiated. Usually, either a company or sector officer will be the initiator. The initiator should describe the apparent hazard and order a positive response, usually to evacuate a particular area of section, according to the scope of the hazard.

If possible, the sector officers of those areas to be evacuated should request an acknowledgment of the emergency traffic dispatch from those crews to be evacuated.

Upon receipt of the emergency traffic evacuation order, company officers shall assemble their crews and promptly exit to a safe location, where the company officer will again account for all crew members. Shortly after the evacuation order, sector officers shall begin the process of accounting for all evacuated crews. When all affected crews and crew members are accounted for, the evacuation process is complete. At this time a more specific determination as to the reality/extent of the hazard can be made and efforts initiated to re-deploy/redirect attack forces.

Building evacuation generally involves a shift from offensive to defensive as an operational strategy. In such cases, Command must develop a corresponding operational plan and must communicate that plan to all operating elements. This can be a difficult shift to complete, as units are committed to positions in an offensive manner. It is extremely important that everyone gets the word that a shift in strategy has been made.

Hazards noted, of a less than imminent nature, should usually be handled by a consultation of Command, sector officers, and/or the safety officer, chief officers, company officers, or outside agency authorities. These officers or specialists should make a determination as to the nature and possible effect of the suspected hazard, and advise Command so that a more knowledgeable decision as to the proper course of action can be made.

Crews retreating from interior operations often require hose line protection. The personnel protection afforded to firefighting personnel in such situations represents a major function of back-up lines.

SEARCH AND RESCUE

Search and rescue should be performed according to an efficient, well-planned procedure which includes the safety of search crew personnel.

The object of the search effort is to locate possible victims, not create additional ones by neglecting the safety of the search crew.

Prior to entering the search area, all search team members should be familiar with a specific search plan including the overall objective, a designation of the search area, individual assignments, etc. This should require a brief conference among crew members before entering the search area to develop and communicate the plan.

Individual search activities will be conducted by two or more members.

Company officers must maintain an awareness of the location and function of all members within their crew during search operations.

Use of an "orientation" person in the door of each room being searched, can increase awareness of escape routes and keep personnel appraised of possible safety hazard developments.

Constant communication is important - but, also be alert for sounds from victims.

A brief look around the floor below the fire may provide a good reference for the search team, as floors in multi-story occupancies usually have a similar layout.

Whenever a search is conducted that exposes search crews to fire conditions (particularly above the fire floor), the search team should be protected as soon as possible with a charged hose line, in order to insure a safe escape route.

If search personnel are operating without a hose line, life lines should be used when encountering conditions of severely limited visibility.

HIGH-RISE SAFETY

Fire personnel conducting operations in high-rise buildings are faced with many non-typical hazards due to the design, elevation, limited access/egress, etc., inherent in these buildings. High rise buildings containing a working fire area are to be considered a high hazard area.

STAIRWAYS/ELEVATORS

If a working fire is suspected in a high-rise building, the following procedures should be adhered to:

1. Utilize stairways to aloft if possible.

2. Elevators may be used to go aloft, provided the following measures have been taken:

    A. The elevator shaft must be checked to insure that heat/fire have not damaged the hoist mechanism, etc. This can be done by checking the space between the door frame and the elevator car and shining a light up on the shaft. If smoke, fire, or water are visible in the shaft, DO NOT USE THE ELEVATOR. It may be used for equipment only.

B. Before using an elevator, the nearest enclosed stairway should be identified; if the elevator should stop at a floor with heavy smoke or intense heat. Firefighters can head directly for the stairs without losing time searching for them.

C. You must verify that the floor you are going to arrive at is uninvolved. This can be done by utilizing the following measures:

Elevators with Firemen Service Feature

(1) Engage the emergency operations.

(2) Take elevator to the floor two floors below the suspected fire floor.

(3) Be prepared to close the elevator door immediately, usually by removing finger from the door control button, if fire or smoke are visible on the floor.

(4) Have a dry chemical fire extinguisher in the elevator, in the event of an emergency, for the personal safety of the operator and passengers.

Elevators without the emergency operations shall not be used if a working fire is indicated.

If elevators are used to transport personnel and equipment, beware of exceeding the maximum load capacity of the elevator.

When operating around a high-rise building where the potential hazards of falling glass and debris exist, a fireground perimeter shall be established approximately 200' from the building, and shall be observed by all fire personnel as a high hazard area. (See Staging Procedure 203.00.)

A fireground perimeter will be at the discretion of Command, based on need.

Pumpers supplying water shall utilize hydrants outside the perimeter area when possible.

Command and staff support personnel shall remain outside the perimeter area unless entering the area to assist with interior operations. (See High-Rise Illustration, Figure 1 and 2.)

To insure accountability of personnel operating in high-rise buildings, the Lobby Control Officer and the Resource Sector Officer, respectively, shall record the names of all crew members going aloft or operating on upper floors. (See Personnel Identification System above.)